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The Impact of Nonresponse on the Unemployment Rate in the Current Population Survey(CPS)[1]

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Abstract: *In the present research we matched CPS data from all consecutive months from January, 1994 to June, 1997 and conducted an analysis similar to a gross flows analysis that included nonrespondents to examine the "flow" of persons from respondent to nonrespondent status in the CPS and the resulting effect on labor force estimates. Persons who were nonrespondents to the CPS one month had higher rates of unemployment, labor force participation, and employment than those who were respondents both months. There were also moderate, but significant positive correlations between the differences on unemployment rates and the overall level of nonresponse in the CPS. There were also some differences in labor force characteristics between refusals and noncontacts.*

Keywords: *gross flows analysis; panel nonresponse.*

1 Introduction

The presence of nonresponse can pose problems for drawing inferences from survey data. Thus, it is not surprising that response rates are often used as an indicator of the quality of survey data. However, nonresponse rates only provide an indication of the potential for bias entering into survey estimates. What is critical is the degree to which respondents and nonrespondents differ on the variables of interest. Ideally, one would hope that nonrespondents are a random cross-section of the sample, reflecting the same demographic, geographic, and economic groups. However, it is typically the case that nonrespondents differ from respondents on these characteristics (for reviews see Goyder 1987, Groves 1989). Therefore, even surveys with high response rates may have some degree of bias in their results if the nonrespondents are strikingly different from the respondents.

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[1] The views expressed in the paper are those of the authors and do not necessarily represent those of the U.S. Bureau of Labor Statistics.

The purpose of the present study was to examine the effect of nonresponse in the Current Population Survey (CPS) on the monthly unemployment rate, the most widely reported result from the CPS, as well as its effects on the labor force participation rate, and percent of the population that is employed. Of course, it is the nature of nonresponse that we don't know the labor force status of those individuals who did not respond to the CPS in a particular month. However, because the CPS is a panel survey in which households are in sample for a total of eight months, we often do eventually obtain labor force information some months even from households who don't respond every month. In this paper, we utilize the analytic technique of gross flows analysis, which is used by economists to examine changes in the labor force status from one month to another, to examine the flow of persons from respondent to nonrespondent status (and vice versa) in the CPS.

1.1 Economic analysis of gross flows

Economists have used gross flow data from panel labor force surveys to examine underlying changes in the labor force classification from one month to the next (e.g., see Barkhume and Horvath 1995, Williams 1995). The monthly labor force "stock" counts give only the total number of people employed or unemployed each month but do not give any indication on what is happening to individuals and how long they may remain unemployed. Indeed, it is possible for there to be little or no month to month change in the overall unemployment rate, but large numbers of people may actually move in or out of unemployment from one month to the next. Specifically, people may move from unemployment to employment (U - E) or vice versa (E - U), or people may search for a job and become unemployed from outside the labor force (N - U), or decide not to keep looking for a job and leave the labor force (U - N).

Data on gross flows is often not published like the monthly totals, and economists have tended to neglect these data for research, perhaps largely due to several methodological problems (see Barkhume and Horvath 1995, Flaim and Hogue 1985, U.S. Dept. of Commerce and U.S. Dept. of Labor 1985). One obvious problem is that the gross flows include only those cases in the survey two consecutive months, which reduces the sample by ¼ due to rotation pattern for the CPS, while movers and nonrespondents effectively reduce the sample further. This results in a discrepancy between the gross flows and the overall labor force counts that can be difficult to estimate. Prior to the 1994 CPS conversion to computerized data collection, matching persons across months was also prone to errors.

1.2 Using gross flows for the study of nonresponse

Although the presence of nonresponse for a particular month leads to these households being excluded for economic analysis that month, we sought to utilize the available information from an adjacent month that the household responded to understand better the characteristics of nonrespondents and the consequences of nonresponse on labor force statistics in the CPS (see also Flaim and Hogue 1985, Stasny and Fienberg 1985, for treatments of non-matches and nonrespondents in analysis of gross flows). Although the vast majority of households that are in the sample in two consecutive months are respondents both of those months (R - R), some households are respondents the first month but do not respond the second month (R - NR), and some are nonrespondents the first month and then become respondents the second month (NR - R). Comparisons can be made between households who responded both months to those that responded only one of the two consecutive months on the labor force characteristics of each of these groups during the month both responded. In addition, we also examined the reason for nonresponse (refusal or noncontact) to see if persons who were interviewed one month, but who refused to participate another month have different labor force characteristics than those who were interviewed one month but were not contacted another month.

2 Design

The CPS is the monthly household labor force survey for the United States conducted by the U.S. Census Bureau for the U.S. Bureau of Labor Statistics. The data collected beginning in January, 1994, are from a redesigned CPS, which incorporates computer-assisted interviewing and a new questionnaire and several improvements in data quality, including a longitudinal identification number that would allow better matching of CPS data from month-to-month. Approximately 50,000 eligible households are sampled each month in a two-stage clustered design.[2] Households selected for the sample are interviewed for 4 consecutive months, are not interviewed 8 months, and then are interviewed again for 4 consecutive months. Furthermore, in any given month, one eighth of the sample is composed of households participating for the first time (month-in-sample 1 (MIS 1)), one eighth the second time (MIS 2), etc. All households except those in for the first time and the fifth time were in sample the previous month; and, therefore, ¾ of the households are the same from month-to-month, and ½ of the households are in the sample the same month from one year to the next.

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[2] Approximately 60,000 households were sampled each month during the period January 1994 - December 1995. The sample was cut to 50,000 households due to budgetary constraints beginning in January, 1996.

2.1 Analysis

Data for the present investigation were drawn from monthly CPS files from January, 1994 to June, 1997. Person and household level records from each consecutive pair of months were matched and the major labor force characteristics (unemployment rate, civilian labor force participation rate, and percentage of the population that was employed) from each month was examined by interview status for the other month. Thus, for a given pair of months, four unemployment rates were calculated. The unemployment rate for the first month was calculated separately for persons who responded both the first and second months and for persons who were nonrespondents the second month. The unemployment rate for the second month was also calculated separately for persons who responded both months and for persons who did not respond the first month. The same procedure was followed for calculating the civilian labor force participation rate and the percentage of the population that was employed.

These labor force characteristics were then compared by examining each series over time (from January 1994 to June, 1997) to determine if there were consistent differences in labor force characteristics for persons who responded both months compared to persons who responded the first month but not the second and persons who did not respond the first month but responded the second month. T-tests were used to compare average levels of each group's labor force estimates over the entire time period studied. When significant differences were demonstrated between respondent and nonrespondent labor force estimates, we further examined the correlations of those differences over time with the levels of overall nonresponse to the CPS to see if increasing levels of nonresponse were associated with greater or lesser differences between respondents and nonrespondents. All of the labor force estimates were calculated using base weights, which reflect only the probability of selection, from the month that the labor force data was obtained.[3]

3 Results

3.1 Overview of nonresponse rates

The overall type A nonresponse rate (refusals, noncontacts, and other noninterviews) for January, 1994 to June 1997 averaged 6.6% and ranged from 5.7% to 9.2.%. There was an increase in nonresponse in January, 1994 with the conversion to a redesigned questionnaire with computerized data collection and some other procedural changes.

[3] There were no further adjustments made for nonresponse or for population controls. Also, no composite estimation was done, nor seasonal adjustment. Therefore, these labor force estimates are NOT comparable to any published figures and are presented here for illustrative research purposes only.

There are often peaks of nonresponse for the annual March Income supplement to the CPS, which is typically the highest nonresponse rate achieved during the year. The highest level of nonresponse occurred in December, 1995 at the time of the U.S. Government Shutdown due to budgetary battles between the White House and Congress. Data collection on the CPS was curtailed with approximately 3,000 cases left in the field.

An examination of the month-to-month match of respondent and nonrespondent households across this 3½ year time period revealed that for any given pair of consecutive months, less than 2% of the households that matched across those months were nonrespondents in either the first or the second month and respondents in the other month. Thus, even when the nonrespondents differed from the respondents in their labor force status (in a month they responded), they had quite a small impact on the overall estimate. Approximately 2 percent each month were nonrespondents both months and, therefore, were not included in these analyses.

3.2 First month unemployment rate by second month interview status

Table 1 shows the average unemployment rate for the first month for persons who were interviewed both months and for those who were interviewed the first month, but became nonrespondents in the second month. Persons in households that did not respond in the second month had consistently higher unemployment rates than those persons who were interviewed both months. As can be seen in Table 1, across this entire time series the average unemployment rate for persons interviewed both months was 5.4%, while it was 6.9% for those who were nonrespondents in the second month, and this difference is significant.

A closer examination of the differences in unemployment rates between persons who responded both months and those who responded the first month but did not respond the second month revealed that the differences were higher in the first six months of the new survey (average difference 2.4%), and also higher during the March Supplements (average difference 2.8%). Since these months had relatively high nonresponse rates, we examined the extent to which the nonresponse rate was related to these differences in unemployment rates between these two groups. The correlation between these two series was significant, but only moderate, $r = .30$, $p < .05$. A further examination of refusals and noncontacts separately showed no consistent pattern of differences between these two subgroups of nonrespondents for unemployment rates (see Table 2).

Table 1: Average levels for labor force status from the CPS by interview status

1st month Labor Force Status	Interview in 2nd month	Nonresponse in 2nd month	Difference
Civilian Labor Force	65.98%	68.51%	2.53%**
Employed	62.45%	63.80%	1.35%**
Unemployment Rate	5.35%	6.87%	1.52%**
2nd month Labor Force Status	**Interview in 1st month**	**Nonresponse in 1st month**	**Difference**
Civilian Labor Force	65.79%	67.41%	1.62%**
Employed	62.39%	63.74%	1.35%**
Unemployment Rate	5.18%	5.48%	.30%*

* $p < .05$, ** $p < .01$

3.3 First month labor force participation rate by second month interview status

The average civilian labor force (CLF) participation rate for the first month for persons who were interviewed both months and for those who were interviewed the first month but became nonrespondents in the second month can be seen in Table 1. Persons who became nonrespondents to the CPS had higher labor force participation rates than those interviewed both months, and the overall average difference in CLF between these two groups was 2.5%.

The differences between respondents both months and nonrespondents the second month in labor force participation rates were not related to the overall nonresponse rate in the CPS. However, the reason for nonresponse did affect labor force participation rates. As can be seen in Table 2, refusals the second month had significantly higher labor force participation rates in the first month than persons who were noncontacts the second month.

Table 2: Differences in labor force status from the CPS by type of nonresponse

1st month Labor Force Status	Refusal in 2nd month	Noncontact in 2nd month	Difference
Civilian Labor Force	69.56%	67.59%	1.97%**
Employed	65.00%	62.80%	2.20%**
Unemployment Rate	6.53%	7.10%	-.57%
2nd month Labor Force Status	**Refusal in 1st month**	**Noncontact in 1st month**	**Difference**
Civilian Labor Force	67.16%	67.34%	-.19%
Employed	63.33%	63.78%	-.45%
Unemployment Rate	5.70%	5.31%	.38%

* $p < .05$, ** $p < .01$

3.4 First month percent employed by second month interview status

The percentage of persons employed is shown separately in Table 1 for those interviewed both months and those interviewed the first month who were nonrespondents the second month. The overall average difference between these two groups was significant over the entire 3 ½ years. The differences between respondents both months and nonrespondents the second month in percent employed were not related to the overall nonresponse rate in the CPS. However, the reason for nonresponse did affect the percent employed. As can be seen in Table 2, refusals the second month had significantly higher percentage employed the first month than persons who were noncontacts the second month.

3.5 Second month unemployment rate by first month interview status

There were small, but significant differences between the unemployment rate for persons who were interviewed both months and for those who were nonrespondents the first month but became respondents in the second month (see Table 1). We also examined the extent to which the nonresponse rate was related to these differences in unemployment rates between these two groups and found that the correlation between these two series was significant, but only moderate, $r = .32$, $p < .05$. There were no significant differences between the first month refusals and noncontacts (see Table 2).

3.6 Second month labor force participation rate by first month interview status

As noted in Table 1, the civilian labor force participation rate for persons who were interviewed both months and for those who were nonrespondents the first month but became respondents in the second month was significantly different. There was no significant relation between the differences and the overall CPS nonresponse rate, and there were no differences between refusals and noncontacts (see Table 2).

3.7 Second month percent employed by first month interview status

The pattern of results for percent employed follows that of labor force participation. The percent employed for persons who were interviewed both months and for those who were nonrespondents the first month but became respondents in the second month were significantly different (see Table 1). However, there was no significant relation between the differences and the overall CPS nonresponse rate, and there were no differences between refusals and noncontacts (see Table 2).

4 Discussion

In the present research we matched CPS data from all consecutive months from January, 1994 to June, 1997 and conducted an analysis similar to a gross flows analysis that included nonrespondents to examine the "flow" of persons from respondent to nonrespondent status in the CPS and the resulting effect on labor force estimates. There appeared to be consistent differences between persons who were respondents to the CPS both months and those who were nonrespondents one month for unemployment rates, labor force participation rates, and percent employed. Persons who were nonrespondents to the CPS one month had higher rates of unemployment, labor force participation, and employment than those who were respondents both months. Although persons who respond one month and are nonrespondents another month represent a very small portion of the total sample any given month, they have consistently different labor force statistics than persons who are respondents both months. There is thus potential for nonresponse bias in the CPS labor force estimates.

We also examined the degree to which the differences between respondents and nonrespondents were related to the magnitude of nonresponse. There were moderate significant positive correlations between the differences on unemployment rates and the level of nonresponse. Thus, there is the potential for increasing nonresponse bias in CPS estimates of unemployment with increasing levels of nonresponse.

Finally, we examined the degree to which refusals and noncontacts have different labor force characteristics. There were fewer differences observed, but second month refusals demonstrated a significantly higher labor force participation rate and percent employed in the first month than second month noncontacts.

4.1 Limitations

Although we took advantage of all available data for consecutive months to examine labor force characteristics of persons who were respondents one month and nonrespondents one month, we obviously still do not know the labor force characteristics of persons in households that were nonrespondents both months, or whether labor force status was different for the nonrespondents during the month they failed to respond than the month they responded. In addition, some people who were consistent respondents in one pair of consecutive months were actually the partial respondents in another pair of months. A complete longitudinal data file for all eight months the household is in the sample would allow a more consistent comparison between partial and complete respondents (see Harris-Kojetin and Tucker, pp. 263-272, this volume).

The labor force estimates compared also utilized only base weights, which reflect only the probability of selection. Further evaluation should be made of nonresponse adjustments and adjustments to population controls to see whether these weighting adjustments decrease the observed differences.

In conclusion, while the presence of nonrespondents may be a methodological problem for normal economic analysis of labor force gross flows, nonrespondents from one month who are interviewed in the other month can be included in the analysis to obtain one measure of the effect of survey nonresponse on labor force estimates. In the CPS, it appears that there is the potential for some small nonresponse bias in the unemployment rate, the labor force participation rate and percent employed due to persons who are nonrespondents one month. However, because of the small number of these people in any given month (usually less than 2% of the ¾ of the overlapping sample), the effects on the overall estimates are quite small. Nonetheless, the effects for the unemployment rate appear to increase with increases in nonresponse rates which reinforces the close monitoring of survey response rates.

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